SEQUENCE LISTING

<110>  Vanderbilt University
       Balser, Jeffrey R.
       George, Alfred L.
       Roden, Dan M.

<120>  HUMAN KCR1 REGULATION OF HERG POTASSIUM CHANNEL BLOCK

<130>  1242-49

<150>  60/244,340
<151>  2000-10-30

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<170>  PatentIn version 3.1

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Phe Leu Val Ser Cys Leu Leu Phe Ser Ala Phe Ser Arg Ala Leu Arg
                20                  25                  30

gag ccc tac atg gac gag atc ttc cac ctg cct cag gcg cag cgc tac     144
Glu Pro Tyr Met Asp Glu Ile Phe His Leu Pro Gln Ala Gln Arg Tyr
            35                  40                  45

tgt gag ggc cat ttc tcc ctt tcc cag tgg gat ccc atg att act aca     192
Cys Glu Gly His Phe Ser Leu Ser Gln Trp Asp Pro Met Ile Thr Thr
        50                  55                  60

tta cct ggc ttg tac ctg gtg tca gtt gga gtg gtc aaa cct gcc att     240
Leu Pro Gly Leu Tyr Leu Val Ser Val Gly Val Val Lys Pro Ala Ile
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    5  aga ttt gtt aat ctt ctc ttc agt gtt ggc aac ttc tat tta cta tat       336
       Arg Phe Val Asn Leu Leu Phe Ser Val Gly Asn Phe Tyr Leu Leu Tyr
                       100                 105                 110

       ttg ctt ttc cac aag gta caa ccc aga aac aag gct gcc tca agt atc       384
   10  Leu Leu Phe His Lys Val Gln Pro Arg Asn Lys Ala Ala Ser Ser Ile
                       115                 120                 125

       cag aga gtc ttg tca aca tta aca cta gca gta ttt cca aca ctt tat       432
       Gln Arg Val Leu Ser Thr Leu Thr Leu Ala Val Phe Pro Thr Leu Tyr
   15      130                 135                 140

       ttt ttt aac ttc ctt tat tat aca gaa gca gga tct atg ttt ttt act       480
       Phe Phe Asn Phe Leu Tyr Tyr Thr Glu Ala Gly Ser Met Phe Phe Thr
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       ctt ttt gca tat ttg atg tgt ctt tat gga aat cat aaa act tca gcc       528
       Leu Phe Ala Tyr Leu Met Cys Leu Tyr Gly Asn His Lys Thr Ser Ala
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   25  ttc ctt gga ttt tgt ggc ttc atg ttt cgg caa aca aat atc atc tgg       576
       Phe Leu Gly Phe Cys Gly Phe Met Phe Arg Gln Thr Asn Ile Ile Trp
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       gct gtc ttc tgt gca ggg aat gtc att gca caa aag tta act gag gct       624
   30  Ala Val Phe Cys Ala Gly Asn Val Ile Ala Gln Lys Leu Thr Glu Ala
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       Trp Lys Thr Glu Leu Gln Lys Lys Glu Asp Arg Leu Pro Pro Ile Lys
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       gga cca ttt gca gaa ttc aga aaa att ctt cag ttt ctt ttg gct tat       720
       Gly Pro Phe Ala Glu Phe Arg Lys Ile Leu Gln Phe Leu Leu Ala Tyr
       225                 230                 235                 240
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       tcc atg tcc ttt aaa aac ttg agt atg ctt ttc tgt ttg act tgg ccc       768
       Ser Met Ser Phe Lys Asn Leu Ser Met Leu Phe Cys Leu Thr Trp Pro
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   45  tac atc ctt ctg gga ttt ctg ttt tgt gct ttt gta gta gtt aat ggt       816
       Tyr Ile Leu Leu Gly Phe Leu Phe Cys Ala Phe Val Val Val Asn Gly
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       gga att gtt att ggc gat cgg agt agt cat gaa gcc tgt ctt cat ttt       864
   50  Gly Ile Val Ile Gly Asp Arg Ser Ser His Glu Ala Cys Leu His Phe
                       275                 280                 285

       cct caa cta ttc tac ttt ttt tca ttt act ctc ttt ttt tct ttt cct       912
       Pro Gln Leu Phe Tyr Phe Phe Ser Phe Thr Leu Phe Phe Ser Phe Pro
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His Leu Leu Ser Pro Ser Lys Ile Lys Thr Phe Leu Ser Leu Val Trp
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aaa cat gga att ctg ttt ttg gtg gtt acc tta gtc tct gtg ttt tta         1008
Lys His Gly Ile Leu Phe Leu Val Val Thr Leu Val Ser Val Phe Leu
                325             330             335

gtt tgg aaa ttc act tat gct cat aaa tac ttg cta gca gac aat aga        1056
Val Trp Lys Phe Thr Tyr Ala His Lys Tyr Leu Leu Ala Asp Asn Arg
            340             345             350

cat tat act ttc tat gtg tgg aaa aga gtt ttt caa aga tat gca att        1104
His Tyr Thr Phe Tyr Val Trp Lys Arg Val Phe Gln Arg Tyr Ala Ile
            355             360             365

ctg aaa tat ttg tta gtt cca gcc tat ata ttt gct ggt tgg agt ata        1152
Leu Lys Tyr Leu Leu Val Pro Ala Tyr Ile Phe Ala Gly Trp Ser Ile
            370             375             380

gct gac tca ttg aaa tca aag cca att ttt tgg aat tta atg ttt ttc        1200
Ala Asp Ser Leu Lys Ser Lys Pro Ile Phe Trp Asn Leu Met Phe Phe
385                 390             395                 400

ata tgc ttg ttc att gtt ata gtt cct cag aaa ctg ctg gaa ttt cgt        1248
Ile Cys Leu Phe Ile Val Ile Val Pro Gln Lys Leu Leu Glu Phe Arg
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tac ttc att tta cct tat gtc att tat agg ctt aac ata act ctg cct        1296
Tyr Phe Ile Leu Pro Tyr Val Ile Tyr Arg Leu Asn Ile Thr Leu Pro
                420             425             430

ccc aca tcc aga ctt gtt tgt gaa ctg agt tgc tat gca att gtt aat        1344
Pro Thr Ser Arg Leu Val Cys Glu Leu Ser Cys Tyr Ala Ile Val Asn
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ttc ata act ttt tac atc ttt ctg aac aag act ttt cag tgg cca aat        1392
Phe Ile Thr Phe Tyr Ile Phe Leu Asn Lys Thr Phe Gln Trp Pro Asn
            450             455             460

agt cag gac att caa agg ttt atg tgg taa tatcagtgat attttgaact         1442
Ser Gln Asp Ile Gln Arg Phe Met Trp
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tttaaacata tgtaagaaat taagtggcaa agaactggga aagcttaaga cctgcttcaa      1622

angcctgaat aatgggaaaa taaanwngtt tncagatatc tcatatcgct cnnnknatgn      1682

tggcccytmn caangcttgg gaatgkttnn wntgnataag ttnattaaan ctgggnntgc      1742

tnnmwatnac ttnnnkncca nccwnnnwac natgnnntan nnantattta caaaggtcag      1802

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Glu Pro Tyr Met Asp Glu Ile Phe His Leu Pro Gln Ala Gln Arg Tyr
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Cys Glu Gly His Phe Ser Leu Ser Gln Trp Asp Pro Met Ile Thr Thr
        50                  55                  60

Leu Pro Gly Leu Tyr Leu Val Ser Val Gly Val Val Lys Pro Ala Ile
65                  70                  75                  80

Trp Ile Phe Gly Trp Ser Glu His Val Val Cys Ser Ile Gly Met Leu
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Arg Phe Val Asn Leu Leu Phe Ser Val Gly Asn Phe Tyr Leu Leu Tyr
            100                 105                 110

Leu Leu Phe His Lys Val Gln Pro Arg Asn Lys Ala Ala Ser Ser Ile
        115                 120                 125

Gln Arg Val Leu Ser Thr Leu Thr Leu Ala Val Phe Pro Thr Leu Tyr
    130                 135                 140

Phe Phe Asn Phe Leu Tyr Tyr Thr Glu Ala Gly Ser Met Phe Phe Thr
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Leu Phe Ala Tyr Leu Met Cys Leu Tyr Gly Asn His Lys Thr Ser Ala
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Phe Leu Gly Phe Cys Gly Phe Met Phe Arg Gln Thr Asn Ile Ile Trp
            180                 185                 190

Ala Val Phe Cys Ala Gly Asn Val Ile Ala Gln Lys Leu Thr Glu Ala
            195                 200                 205

Trp Lys Thr Glu Leu Gln Lys Lys Glu Asp Arg Leu Pro Pro Ile Lys
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Gly Pro Phe Ala Glu Phe Arg Lys Ile Leu Gln Phe Leu Leu Ala Tyr
225                 230                 235                 240
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         Ser Met Ser Phe Lys Asn Leu Ser Met Leu Phe Cys Leu Thr Trp Pro
                     245             250             255

    5    Tyr Ile Leu Leu Gly Phe Leu Phe Cys Ala Phe Val Val Val Asn Gly
                     260             265             270

         Gly Ile Val Ile Gly Asp Arg Ser Ser His Glu Ala Cys Leu His Phe
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    10
         Pro Gln Leu Phe Tyr Phe Phe Ser Phe Thr Leu Phe Phe Ser Phe Pro
                 290             295             300

         His Leu Leu Ser Pro Ser Lys Ile Lys Thr Phe Leu Ser Leu Val Trp
    15   305             310             315             320

         Lys His Gly Ile Leu Phe Leu Val Val Thr Leu Val Ser Val Phe Leu
                     325             330             335

    20   Val Trp Lys Phe Thr Tyr Ala His Lys Tyr Leu Leu Ala Asp Asn Arg
                     340             345             350

         His Tyr Thr Phe Tyr Val Trp Lys Arg Val Phe Gln Arg Tyr Ala Ile
                     355             360             365
    25
         Leu Lys Tyr Leu Leu Val Pro Ala Tyr Ile Phe Ala Gly Trp Ser Ile
                 370             375             380

         Ala Asp Ser Leu Lys Ser Lys Pro Ile Phe Trp Asn Leu Met Phe Phe
    30   385             390             395             400

         Ile Cys Leu Phe Ile Val Ile Val Pro Gln Lys Leu Leu Glu Phe Arg
                     405             410             415

    35   Tyr Phe Ile Leu Pro Tyr Val Ile Tyr Arg Leu Asn Ile Thr Leu Pro
                     420             425             430

         Pro Thr Ser Arg Leu Val Cys Glu Leu Ser Cys Tyr Ala Ile Val Asn
                 435             440             445
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         Phe Ile Thr Phe Tyr Ile Phe Leu Asn Lys Thr Phe Gln Trp Pro Asn
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5   Asn Ala Arg Val Glu Asn Cys Ala Val Ile Tyr Cys Asn Asp Gly Phe
            35              40              45

    Cys Glu Leu Cys Gly Tyr Ser Arg Ala Glu Val Met Gln Arg Pro Cys
        50              55              60

10  Thr Cys Asp Phe Leu His Gly Pro Arg Thr Gln Arg Arg Ala Ala Ala
    65              70              75              80

    Gln Ile Ala Gln Ala Leu Leu Gly Ala Glu Glu Arg Lys Val Glu Ile
                85              90              95
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    Ala Phe Tyr Arg Lys Asp Gly Ser Cys Phe Leu Cys Leu Val Asp Val
            100             105             110

    Val Pro Val Lys Asn Glu Asp Gly Ala Val Ile Met Phe Ile Leu Asn
20          115             120             125

    Phe Glu Val Val Met Glu Lys Asp Met Val Gly Ser Pro Ala His Asp
        130             135             140

25  Thr Asn His Arg Gly Pro Pro Thr Ser Trp Leu Ala Pro Gly Arg Ala
    145             150             155             160

    Lys Thr Phe Arg Leu Lys Leu Pro Ala Leu Leu Ala Leu Thr Ala Arg
                165             170             175
30
    Glu Ser Ser Val Arg Ser Gly Gly Ala Gly Gly Ala Gly Ala Pro Gly
            180             185             190

    Ala Val Val Val Asp Val Asp Leu Thr Pro Ala Ala Pro Ser Ser Glu
35          195             200             205

    Ser Leu Ala Leu Asp Glu Val Thr Ala Met Asp Asn His Val Ala Gly
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40  Leu Gly Pro Ala Glu Glu Arg Arg Ala Leu Val Gly Pro Gly Ser Pro
    225             230             235             240

    Pro Arg Ser Ala Pro Gly Gln Leu Pro Ser Pro Arg Ala His Ser Leu
                245             250             255
45
    Asn Pro Asp Ala Ser Gly Ser Ser Cys Ser Leu Ala Arg Thr Arg Ser
            260             265             270

    Arg Glu Ser Cys Ala Ser Val Arg Arg Ala Ser Ser Ala Asp Asp Ile
50          275             280             285

    Glu Ala Met Arg Ala Gly Val Leu Pro Pro Pro Arg His Ala Ser
        290             295             300

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    305             310             315             320

Asp Ser Asp Leu Val Arg Tyr Arg Thr Ile Ser Lys Ile Pro Gln Ile
             325                   330             335

Thr Leu Asn Phe Val Asp Leu Lys Gly Asp Pro Phe Leu Ala Ser Pro
             340               345            350

Thr Ser Asp Arg Glu Ile Ile Ala Pro Lys Ile Lys Glu Arg Thr His
         355             360            365

Asn Val Thr Glu Lys Val Thr Gln Val Leu Ser Leu Gly Ala Asp Val
         370             375           380

Leu Pro Glu Tyr Lys Leu Gln Ala Pro Arg Ile His Arg Trp Thr Ile
385             390           395              400

Leu His Tyr Ser Pro Phe Lys Ala Val Trp Asp Trp Leu Ile Leu Leu
             405              410           415

Leu Val Ile Tyr Thr Ala Val Phe Thr Pro Tyr Ser Ala Ala Phe Leu
         420             425           430

Leu Lys Glu Thr Glu Glu Gly Pro Pro Ala Thr Glu Cys Gly Tyr Ala
         435             440           445

Cys Gln Pro Leu Ala Val Val Asp Leu Ile Val Asp Ile Met Phe Ile
         450             455           460

Val Asp Ile Leu Ile Asn Phe Arg Thr Thr Tyr Val Asn Ala Asn Glu
465             470           475              480

Glu Val Val Ser His Pro Gly Arg Ile Ala Val His Tyr Phe Lys Gly
         485             490           495

Trp Phe Leu Ile Asp Met Val Ala Ala Ile Pro Phe Asp Leu Leu Ile
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Phe Gly Ser Gly Ser Glu Glu Leu Ile Gly Leu Leu Lys Thr Ala Arg
         515             520           525

Leu Leu Arg Leu Val Arg Val Ala Arg Lys Leu Asp Arg Tyr Ser Glu
         530             535           540

Tyr Gly Ala Ala Val Leu Phe Leu Leu Met Cys Thr Phe Ala Leu Ile
545             550           555              560

Ala His Trp Leu Ala Cys Ile Trp Tyr Ala Ile Gly Asn Met Glu Gln
             565              570           575

Pro His Met Asp Ser Arg Ile Gly Trp Leu His Asn Leu Gly Asp Gln
         580             585           590

Ile Gly Lys Pro Tyr Asn Ser Ser Gly Leu Gly Gly Pro Ser Ile Lys
         595             600           605

Asp Lys Tyr Val Thr Ala Leu Tyr Phe Thr Phe Ser Ser Leu Thr Ser
         610             615           620

Val Gly Phe Gly Asn Val Ser Pro Asn Thr Asn Ser Glu Lys Ile Phe
625              630              635              640

Ser Ile Cys Val Met Leu Ile Gly Ser Leu Met Tyr Ala Ser Ile Phe
5                    645              650              655

Gly Asn Val Ser Ala Ile Ile Gln Arg Leu Tyr Ser Gly Thr Ala Arg
                 660              665              670

Tyr His Thr Gln Met Leu Arg Val Arg Glu Phe Ile Arg Phe His Gln
10       675              680              685

Ile Pro Asn Pro Leu Arg Gln Arg Leu Glu Glu Tyr Phe Gln His Ala
         690              695              700

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Trp Ser Tyr Thr Asn Gly Ile Asp Met Asn Ala Val Leu Lys Gly Phe
705              710              715              720

Pro Glu Cys Leu Gln Ala Asp Ile Cys Leu His Leu Asn Arg Ser Leu
20               725              730              735

Leu Gln His Cys Lys Pro Phe Arg Gly Ala Thr Lys Gly Cys Leu Arg
         740              745              750

25 Ala Leu Ala Met Lys Phe Lys Thr Thr His Ala Pro Pro Gly Asp Thr
         755              760              765

Leu Val His Ala Gly Asp Leu Leu Thr Ala Leu Tyr Phe Ile Ser Arg
         770              775              780

30

Gly Ser Ile Glu Ile Leu Arg Gly Asp Val Val Val Ala Ile Leu Gly
785              790              795              800

35 Lys Asn Asp Ile Phe Gly Glu Pro Leu Asn Leu Tyr Ala Arg Pro Gly
             805              810              815

Lys Ser Asn Gly Asp Val Arg Ala Leu Thr Tyr Cys Asp Leu His Lys
         820              825              830

40 Ile His Arg Asp Asp Leu Leu Glu Val Leu Asp Met Tyr Pro Glu Phe
         835              840              845

Ser Asp His Phe Trp Ser Ser Leu Glu Ile Thr Phe Asn Leu Arg Asp
    850              855              860

45

Thr Asn Met Ile Pro Gly Ser Pro Gly Ser Thr Glu Leu Glu Gly Gly
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Phe Ser Arg Gln Arg Lys Arg Lys Leu Ser Phe Arg Arg Arg Thr Asp
50               885              890              895

Lys Asp Thr Glu Gln Pro Gly Glu Val Ser Ala Leu Gly Pro Gly Arg
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        Pro Arg Pro Pro Gly Glu Pro Pro Gly Gly Glu Pro Leu Met Glu Asp
                        965                 970                 975

   10   Cys Glu Lys Ser Ser Asp Thr Cys Asn Pro Leu Ser Gly Ala Phe Ser
                    980                 985                 990

        Gly Val Ser Asn Ile Phe Ser Phe  Trp Gly Asp Ser Arg  Gly Arg Gln
                995                 1000                1005

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        Tyr Gln  Glu Leu Pro Arg Cys  Pro Ala Pro Thr Pro  Ser Leu Leu
            1010                1015                1020

        Asn Ile  Pro Leu Ser Ser Pro  Gly Arg Arg Pro Arg  Gly Asp Val
   20       1025                1030                1035

        Glu Ser  Arg Leu Asp Ala Leu  Gln Arg Gln Leu Asn  Arg Leu Glu
            1040                1045                1050

   25   Thr Arg  Leu Ser Ala Asp Met  Ala Thr Val Leu Gln  Leu Leu Gln
            1055                1060                1065

        Arg Gln  Met Thr Leu Val Pro  Pro Ala Tyr Ser Ala  Val Thr Thr
            1070                1075                1080

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        Pro Gly  Pro Gly Pro Thr Ser  Thr Ser Pro Leu Leu  Pro Val Ser
            1085                1090                1095

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            1100                1105                1110

        Phe Met  Ala Cys Glu Glu Leu  Pro Pro Gly Ala Pro  Glu Leu Pro
            1115                1120                1125

   40   Gln Glu  Gly Pro Thr Arg Arg  Leu Ser Leu Pro Gly  Gln Leu Gly
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      gac gtc ttc cga agg att ttt att act tat atg gac aat tgg cgc cag      157
      Asp Val Phe Arg Arg Ile Phe Ile Thr Tyr Met Asp Asn Trp Arg Gln
               15                  20                  25

 15   aac aca aca gct gag caa gag gcc ctc caa gcc aaa gtt gat gct gag      205
      Asn Thr Thr Ala Glu Gln Glu Ala Leu Gln Ala Lys Val Asp Ala Glu
               30                  35                  40

      aac ttc tac tat gtc atc ctg tac ctc atg gtg atg att gga atg ttc      253
 20   Asn Phe Tyr Tyr Val Ile Leu Tyr Leu Met Val Met Ile Gly Met Phe
      45                  50                  55                  60

      tct ttc atc atc gtg gcc atc ctg gtg agc act gtg aaa tcc aag aga      301
      Ser Phe Ile Ile Val Ala Ile Leu Val Ser Thr Val Lys Ser Lys Arg
 25                       65                  70                  75

      cgg gaa cac tcc aat gac ccc tac cac cag tac att gta gag gac tgg      349
      Arg Glu His Ser Asn Asp Pro Tyr His Gln Tyr Ile Val Glu Asp Trp
                       80                  85                  90
 30
      cag gaa aag tac aag agc caa atc ttg aat cta gaa gaa tcg aag gcc      397
      Gln Glu Lys Tyr Lys Ser Gln Ile Leu Asn Leu Glu Glu Ser Lys Ala
                       95                 100                 105

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               110                 115                 120

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      cgaggcaaat ccaaattgtc tttgcttaga agaaagtgag ttccttgctc tctgttgaga     565

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                20                  25                  30

Glu Gln Glu Ala Leu Gln Ala Lys Val Asp Ala Glu Asn Phe Tyr Tyr
        35                  40                  45

Val Ile Leu Tyr Leu Met Val Met Ile Gly Met Phe Ser Phe Ile Ile
        50                  55                  60

Val Ala Ile Leu Val Ser Thr Val Lys Ser Lys Arg Arg Glu His Ser
65                  70                  75                  80

Asn Asp Pro Tyr His Gln Tyr Ile Val Glu Asp Trp Gln Glu Lys Tyr
                85                  90                  95

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